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intensities of these bands are also the same, with one exception, allowing for the differences of dispersion and absorption of the instruments used. The band at λ 420 is quite conspicuous in both of the earlier comets, but is very weak in Comet Borrelly.

Very little continuous spectrum is shown in the photograph, although it seemed quite strong in the visual portion of the spectrum.

C. D. P.

July 19, 1903.

ELEMENTS OF COMET *c* 1903 (BORRELLY).

The following orbit was computed from observations made on June 22d, 30th, and July 10th, by Dr. AITKEN:—

$$T = 1903, \text{ August } 27^{d}.6056, \text{ Gr. M. T.}$$

$$\left.\begin{array}{rl} \omega = & 127^\circ\ 19'\ 25''.5 \\ \Omega = & 293\ \ 32\ \ 55.0 \\ i = & 84\ \ 59\ \ 45.3 \end{array}\right\} 1903.0$$

$$\log q = 9.518126$$

Residuals (O – C) :—

$\Delta\lambda' \cos\beta'$ $-1''.0$

$\Delta\beta'$ $+5.7$

The orbit of this comet bears no close resemblance to any previously observed.

An extended ephemeris shows that the comet reaches a north declination of over 68° on July 20th. It then turns south, with diminished geocentric motion, and at the time of perihelion is still 15° north of the Sun on almost the same meridian. It will thus be visible as an early evening object until after its perihelion passage, after which it will become a morning object for a few days. As its southward motion is rapid, it will soon after be lost to northern observers.

Its theoretical brightness reached a maximum on July 17th, when it was fourteen times brighter than at discovery. At perihelion its theoretical brightness is 8. Its observed brightness will, in all probability, be greater than theory indicates.

July 19, 1903. C. D. P.

PRELIMINARY NOTE ON PHOTOGRAPHIC OBSERVATIONS OF COMET *c* 1903 (BORRELLY).

Photographic observations of Comet *c* 1903 (BORRELLY) were begun at the Lick Observatory on the night succeeding that of discovery, and are still in progress. Nine exposures, ranging in length from thirty-eight minutes to four hours, have been made with the Dallmeyer camera of 15^{cm} aperture, 82.6^{cm} equivalent focal length, and 14° × 16° angular field. Three negatives with the same range of exposure have been obtained simultaneously with the Floyd camera of 13^{cm} aperture and 178^{cm} focal length.

Two tails, one of which is nearly straight, the other greatly curved, appear on all but the last plate. The curved tail is short and very bright, while the straighter tail is relatively fainter and longer but develops some very interesting forms.

On a plate of four hours' exposure, on June 23d, the tails are widely separated. The straight tail is narrow at the head, but broadens and extends 1½ degrees. On the plate of June 29th the longer tail has split up into two distinct branches, which emerge separately from the head and diverge slightly as they extend into space. With four hours' exposure on June 30th, the secondary tail appears very bright, with a length of 1½ degrees. The primary extends five degrees from the nucleus. The form is indistinct, but the division of the previous night still persists. One branch remains straight, while the other is broader and longer and follows a sinuous curve. On the following night the straight tail is sharp and single.

The plates of July 12th and 13th still show two tails. The primary tail is straight and narrow, and the secondary tail still greatly curved. On the plate of July 12th, with thirty-eight minutes' exposure, the primary tail is four degrees long; the secondary tail is 1.5 degrees in length. The plate of July 14th, $1^h\ 48^m$ exposure, shows one straight narrow tail 8½ degrees in length, widening out slightly as it extends away from the head.

On all the plates the nucleus is sharp and approximately central with respect to the heavy coma.

During these exposures the Earth has been approaching rapidly to the plane of the comet's orbit. At the same time the apparent angle between the tails has steadily diminished until, on the plate of July 14th, they are coincident. Measures of the position-angles of the tails on two plates are given below. P_a, P_b, and P_r represent respectively the position-angles of the primary tail, secondary tail, and radius vector from the

Sun to the comet. The difference $P_a - P_r$ appears in the last column.

No. of Plate.	Date, 1903.	P. S. T. of Mid-exposure.	α	δ	P_a	P_b	P_r	$P_a - P_r$
5	June 30	$13^h\ 33^m$	$21^h\ 41^m.5$	$+\ 2^\circ\ 48'$	236°.0	216.8	238.0	—2°.0
7	July 12	8 52	20 34 .2	+39 23	197 .3	188.0	199 6	—2 .3

R. H. CURTISS.
SEBASTIAN ALBRECHT.

HONORS CONFERRED UPON MEMBERS OF THE LICK OBSERVATORY STAFF.

The honorary degree of Doctor of Science was conferred upon Assistant Astronomer R. G. AITKEN in May by the University of the Pacific.

Astronomer W. J. HUSSEY was elected Foreign Associate of the Royal Astronomical Society at their meeting May 8, 1903.

W. W. C.

APPOINTMENTS TO LICK OBSERVATORY STAFF.

Dr. JOSEPH H. MOORE, recently of Johns Hopkins University, has been appointed Assistant in Spectroscopy.

JAMES D. MADDRILL, University of California, Class of 1903, has been appointed Fellow in Astronomy in the Lick Observatory for the current academic year.

W. W. C.

D. O. MILLS EXPEDITION TO CHILE.

Acting Astronomer WRIGHT, in charge of the D. O. Mills expedition to Chile, has selected the summit of the hill San Cristobal as the site for the observing station. This hill lies on the northeast edge of the city of Santiago. The altitude of Santiago is 560 meters, and that of San Cristobal about 850 meters. There is a road to the top. "The summit is a ridge about one fourth of a mile long, with three peaks, not unlike Mt. Hamilton."

W. W. CAMPBELL.

MT. HAMILTON, July 17, 1903.